

AMENDMENT AND RESPONSE

Serial Number: 09/253,611

Filing Date: February 19, 1999

Title: SELECTIVE DEPOSITION OF SOLDER BALL CONTACTS

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removing a portion of the insulating layer to expose a portion of the metal contact pad, thereby forming the exposed portion of the metal contact pad, the exposed portion having a predetermined diameter;

electrolytically depositing a first metal layer on the exposed portion of the metal contact pad;

electrolytically depositing a second metal layer on the first metal layer, wherein the first metal layer and the second metal layer form a solder contact;

removing the resist layer, thereby exposing the solder contact above a surface of the insulating layer; and

annealing the solder contact to form a solder ball contact.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on March 31, 2000, and the references cited therewith.

Claims 1, 12, 13 and 16 are amended. Claims 24-63 are withdrawn from consideration as being drawn to a nonelected invention. As a result, claims 1-23 are now pending in this application.

Rejections Under 35 U.S.C. §102

Cook et al.

Claims 1-7 and 12 were rejected under 35 U.S.C. §102(b) as being anticipated by Cook et al. (U.S. Patent No. 5,457,345).

Applicant respectfully notes that Applicant cannot find in Cook et al. a teaching or suggestion of depositing solder on an exposed portion of a metal contact pad using a deposition process selected from the group consisting of immersion contact, chemical vapor deposition and electrolytic deposition, thereby forming a solder contact in Cook et al. at col. 5, lines 1-10 and 37-49. Applicant also notes that at page 3, paragraph 5 the Office Action states that Cook fails to disclose the step of immersing the substrate in molten solder. Clarification of whether the Examiner maintains that Cook et al. teach such a step, and where such a teaching can be found is respectfully requested.

However, Applicant has amended claim 1 to clarify that the substrate is immersed in molten solder. This is supported by the specification at page 4, lines 13-14. Applicant has also amended claims 1 and 12 to clarify that the exposed portion of the metal contact pad has a predetermined diameter. This is supported by the specification at page 4, lines 6-10 and at page 12, lines 1-14 and claims 8, 11, and 23 as filed.

A claim is anticipated only if each of the limitations of the claim is included in the reference. At page 3 paragraph 5, the Office Action states that Cook et al. fail to disclose the limitation of immersing the substrate in molten solder, as is now set forth in claim 1. The Office Action also states at page 3, paragraph 5 that Cook et al. fail to disclose the limitation of forming and exposed portion of the metal contact pad having a specific diameter, as is now set forth in claims 1 and 12.

Claim 1 and claims 2-7 depending therefrom, and claim 12 as clarified by the foregoing amendments to claims 1 and 12, therefore patentably distinguish over Cook et al. Withdrawal of the stated rejection is respectfully requested.

Rejections Under 35 U.S.C. §103

Cook et al.

At paragraph 5 of the Office Action, claims 9-11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Cook et al.

Under 35 U.S.C. Section 103, the U.S. Patent and Trademark Office has the burden of establishing a *prima facie* case of obviousness. The burden can be satisfied "*only* by showing some *objective* teaching in the prior art or knowledge generally available to one of ordinary skill in the art." (Emphasis Added). *In re Fine*, 837 F.2d 1071 (CAFC 1988). Thus, one must be able to point to something in the prior art that suggests in some way the modification of the particular reference to obtain the claimed invention. Accordingly, for reasons which follow, neither Cook et al. nor any combination thereof teaches or suggests Applicant's novel methods as recited by claims 9-11, or claims 8-12, 15, 20 and 23. Nor is there any objective teaching in Cook et al. that would suggest modifying the embodiments disclosed therein to obtain the present invention.

Cook et al. fail to establish all of the elements of claims 8-12, 15, 20 and 23. At paragraph 5 the Office Action discusses claims 8-12, 15, 20 and 23, listing the limitations thereof which Cook et al. fail to disclose. The limitations noted to be absent in Cook et al. include

“immersing the substrate in molten solder”, “further comprises forming an exposed portion of the metal contact pad having a specific diameter”, “wherein the insulating layer has a thickness of approximately 1.5 microns”, “wherein the layer of tin has a thickness of approximately 1.42 microns”; and “wherein the layer of lead and the layer of tin form a solder contact having a thickness of approximately 2.33 microns”. The Office Action takes official notice that “it is well known in the art and therefore prima facie obvious to incorporate the above limitations in Cook et al. or Strube, because they are conventional thicknesses, diameters and deposition processes”.

Applicant respectfully objects to the taking of Official Notice of these elements of the claims missing in the prior art, and pursuant to MPEP § 2144.03, Applicant respectfully traverses the assertion of Official Notice and request that the Office Action cite references in support of this position. If the Examiner's rejection is grounded in facts included in the Examiner's personal knowledge, Applicant requests that the Examiner support the personal knowledge with an affidavit as provided for in 37 C.F.R. § 1.104(d)(2). If the Examiner is unable to cite a reference that teaches these elements as described by the Applicant in the present invention or provide an affidavit, Applicant respectfully requests reconsideration and allowance of claims 8-12, 15, 20 and 23.

Cook et al. In View Of Strube

Claims 13-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cook et al. as applied to claim 1, and further in view of Strube et al. (U.S. Patent No. 4,650,548).

Applicant has amended claims 13 and 16 to clarify that the exposed portion of the metal contact pad has a predetermined diameter. This is supported by the specification at page 4, lines 6-10 and at page 12, lines 1-14 and claims 8, 11, and 23 as filed. At page 3 paragraph 5, the Office Action states that Cook et al. fail to disclose the limitation of forming an exposed portion of the metal contact pad having a specific diameter. Further, Applicant cannot find in the combination of references a method of forming a solder ball contact which comprises forming an exposed portion of a metal contact having a specific or predetermined diameter. This limitation is present in claims 13-23, which are believed to patentably distinguish over the cited combination of references. The combination of Cook et al. and Strube fail to establish all of the elements of claims 13-23.

Applicant reiterates its traversal of the assertion of Official Notice of this element of the claims missing in the prior art pursuant to MPEP § 2144.03. Applicant respectfully traverses the

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assertion of Official Notice and requests that the Examiner cite references in support of this position. If the Office Action's rejection is grounded in facts included in the Examiner's personal knowledge, Applicants request that the Examiner support the personal knowledge with an affidavit as provided for in 37 C.F.R. § 1.104(d)(2). If the Examiner is unable to cite a reference that teaches this elements as described by the Applicant in the present invention or provide an affidavit, Applicant respectfully requests reconsideration and allowance of claims 13-23.

Applicant notes further that this limitation is also present in claims 1-8, 11, and 12 and that this request be applied to these claims which are believed to patentably distinguish over the cited combination of references.

In view of the foregoing, withdrawal of the stated rejection is respectfully requested.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and early notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 371-2148 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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6/30/00

By


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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Assistant Commissioner of Patents, Washington, D.C. 20231 on June 30, 2000.

Name

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Signature

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